

**VOCALISATION BY THE COMMON EASTERN AUSTRALIAN GECKO, *GEHYRA DUBIA*.** *Memoirs of the Queensland Museum* 49(1): 485-6. 2003: Information on vocalisation in Australian geckos is scant. A handful of native species are known to call and one introduced to Australia, the house gecko, *Hemidactylus frenatus* Dumeril & Bibron, 1836, has a loud distinctive call. Most calls reported for Australian geckos have been related to fighting, (e.g. *Diplodactylus* - Bustard, 1965; *Gehyra* - Bustard, 1969; Frankenberg & Werner, 1984), or confrontation with a predator (e.g. *Christinus* Daniels et al., 1986; *Nephrurus asper* - Bustard, 1967; Greer pers. obs., 1989; *Phyllurus platurus* - Greer pers. obs., 1989). On Boyne Island, in Central Queensland, *Gehyra dubia* Macleay, 1877 is commonly found in acacia, eucalyptus woodlands and the surrounding urban areas. This gecko is usually arboreal and is frequently observed on the walls of houses, both in and outside, and other domestic structures.

During late September, 1997, I recorded the calls produced by *Gehyra dubia* specimens for the first time. This was achieved by holding 4 captive *G. dubia* (sample 1, 3 ♀, 1 ♂) in two small, transparent containers. Two geckos were placed in each container and microphones were secured to the lids. The outputs from these two microphones were connected to a stereo cassette recorder. At night, between the 23-27/9/97, a series of ½ hr recordings was made. This was followed by recordings during late October 1997 (sample 2-2♂, 2♀), mid February 1998 (sample 3-2♂), late January 2001 (sample 4-2♂), and late September 2001 (sample 5-♂, ♀). Sample 6, early June 2003 (4♀, 2♂), was not recorded, but closely observed to establish if both sexes produced all three calls. Four ♀ were placed in one container, and the 2 ♂ in another.

Examination of these recordings and my observations between 1989-2003 indicate that *Gehyra dubia* has at least three distinct calls: a distress call, a chirp and a fast chatter. These recordings have been digitised (AWE Sound Blaster Card; Sampling rate, 44,100, 22,050, 11,025; sampling size 16 bit), and reproduced into audiographs (Fig. 1A-C). This has enabled accurate measurements of the call duration (in seconds) and a comparison of the amplitude of pulses within a call. Individual pulses and number of pulses per call were verified by reducing the play-back sampling rate to 11,025Hz. The dominant frequency band of individual pulses (the frequency at which most sound energy is transmitted), and pulse width was achieved by using a freeware dual channel audio spectrum analyser (Gram 50 program). This provided a scrolling time-frequency display (Fig. 2A-C). Only recordings of high resolution were used for frequency analysis and pulse width measurements.

Although these recordings are of the calls of captive geckos, calls are consistent with those heard in the wild. Reasons for these vocalisations are unknown. It was possible to distinguish between the sexes of adults by examining the neck and cloacal regions of each specimen: males lack obvious endolymphatic calcium stores; have distinct preanal pores aligned in an inverted 'V'; distinct postcloacal sacs and enlarged postanal tubercles. Females have distinct endolymphatic calcium stores, moderate postanal tubercles, but lack preanal pores and expanded postcloacal sacs.

#### *Gehyra dubia* calls

Type 1 - distress: when fighting, specimens often release a one pulse clamor which is louder and more drawn out than other calls. This was not recorded, but has been displayed by both sexes (sample 6).

Type 2 - the chirp (eee...eee...eee) has been heard frequently. Both ♂♂ & ♀♀ produce this call (sample 6). However, it has been possible to record this call on only three occasions (CH1, CH1a and CHFC1). This call is displayed as

a single pulse, or a series of chirps with long intervals between pulses. Recording CH1 (Fig. 1A), 2♀♀, consisted of 6 pulses/11.2s; recording CH1a (2♀♀), is of a single pulse; recording CHFC1 (Fig. 1B), ♂♂ & ♀♀, multiple chirp portion, 4 pulses/5.6s. Estimated, dominant frequency band of individual pulses varies between 2.6-3.8KHz. The pulse width is between 140-228 milliseconds. Pulses peter out at 6.3-8.7KHz.

Type 3 - the fast chatter (ee.ee.ec) is, by far, the most frequently heard, and has been recorded in FC1-11. Adult ♂♂ often exhibit this call (Table 1).

Total pulses per call ranged from 9-23. Pulses per second (pulse rate) varied from 6-8.3. The call duration varied from 1.2-3.6s. Pulse width range 72-167ms. Dominant frequency range 2.6-3.8kHz. The first pulse of recordings FC 2,5,8,10 and 11 varied between 72-125ms and have a lower frequency range than proceeding pulses. Pulses peter out at 3.7-7kHz.

An analysis of these recordings has established that ♂♂ produce the fast chatter (FC5-FC10). ♀♀ have produced the chirp (CH1 and CH1a). When the combination of ♂♂ and ♀♀ was used for a recording, I was unable to ascertain which gecko called.

#### Conclusion

*Gehyra dubia* does frequently call. The calls heard and/or analysed can be categorised into three distinct groups: 1) the distress, 2) the chirp, and 3) the fast chatter. Both sexes exhibit the distress call. The chirp call has also been produced by both ♂♂ & ♀♀. Pulses of the chirp call are often long (up to 228ms), lack intensity, and are exhibited as a single pulse or a series of pulses with long intervals between. The fast chatter has been strongly exhibited by ♂♂ only, and is frequently heard throughout my house. The amplitude of these pulses is high, and typically intensifies in the latter portion of the call (Fig. 1C). Pulses of the fast chatter are short (<167ms), and are carried out over a short period (<3.6s). Estimated dominant frequencies of the chirp and fast chatter calls are quite similar (2.6-3.8kHz). Differentiation between both types of calls includes, pulse rate, pulse width and call intensity.

Only one recording consisted of both the chirp and fast chatter calls - CHFC1. ♂♂ & ♀♀, sample 1 (four chirps followed instantly by 17 fast chatter pulses, Fig. 1B). By comparison to other recordings (CH1, CH1a and FC5-10), and the very short transition period from chirps to chatter, it is quite reasonable to suggest that the call of recording CHFC1 consists of a ♀ followed by a ♂. However, this would need to be verified by a higher sample rate.

The reasons for these calls are unknown. However, it does not seem unreasonable to speculate that they relate to sex recognition and territory definition and defence as has been postulated for many other animal calls.

#### Acknowledgements

For assistance in preparing this paper, thanks are due to Jeanette Covacevich for advice on the manuscript; Dr Mark Hutchinson (South Australian Museum) and Peter Robertson (Wildlife Profiles) both imparted their knowledge on sexual dimorphism within the gecko family; Jon Butterworth (Electrical Engineer, Queensland Cement Ltd) for guidance on the Gram 50 program and analysis on sound waves; Assoc. Prof. Ross Alford and Dr Lin Schwarzkopf of James Cook University for forwarding the Gram 50 program and sharing their knowledge on the analysis and identification of biological sounds. Special thanks to my wife Inge for tolerating the disturbances and inconvenience of such a study. John Toop of the Department of Environment and Heritage provided study permits.

#### Literature Cited

BUSTARD, H.R. 1965. The systematic status of the Australian geckos *Gehyra variegata* (Dumeril and Bibron, 1836) and *Gehyra*

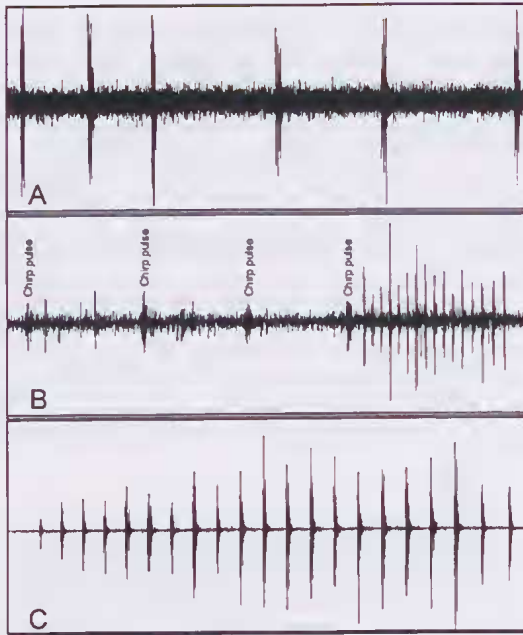


FIG. 1. Audiographs. A, CH1, sample 1, 2 ♀♀, 6 pulses, call duration ~11.2s. B, CHFC1, sample 1, ♂ & ♀, call duration ~8.2s. C, FC10, sample 4, 2 ♂♂, 21 pulses, call duration ~3.6s.

- australis* (Gray, 1845). *Herpetologia* 20(4): 259-72.  
 1967. Defensive display behaviour of the Australian gecko *Nephrurus asper*. *Herpetologia* 23(2): 126-29.  
 1969. The population ecology of the gekkonid lizard *Gehyra variegata* (Duméril and Bibron) in exploited forests in northern New South Wales. *Journal of Animal Ecology* 38: 35-51.  
 DANIELS, C.B., FLAHERTY, S.P. & SIMBOTWE, M.P. 1986. Tail size and effectiveness of autotomy in a lizard. *Journal of Herpetology* 20(1): 93-96.  
 FRANKENBERG, E. & WERNER, Y.L. 1984. The defensive vocal "distress" repertoire of gekkonid lizards: intra-and-inter-specific variation. *Amphibia-Reptilia* 5(2): 109-24.  
 GREER, A. 1989. The biology and evolution of Australian lizards. (Surrey Beatty & Sons: Chipping Norton).

Peter R. Tremul, 5 Kilman Court, Boyne Island 4680, Australia; 10 June 2003.

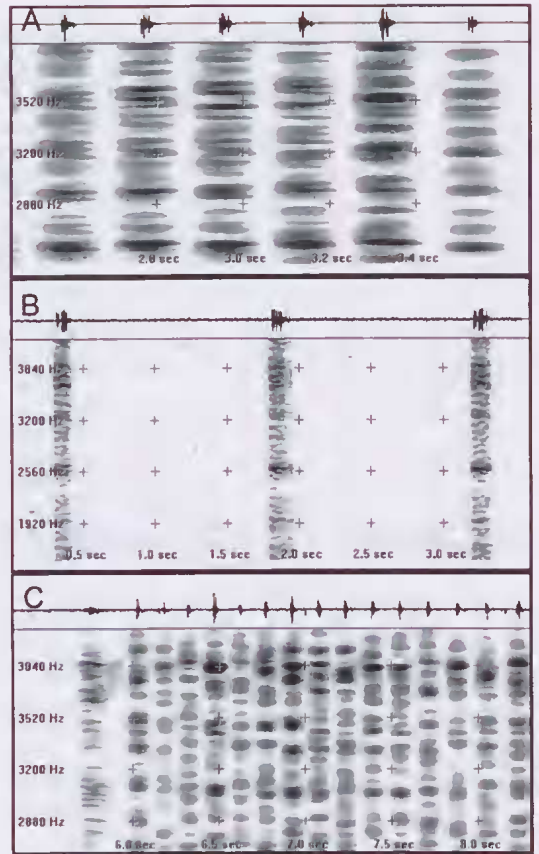


FIG. 2. Spectrographs. A, FC10, sample 4, 2 ♂♂, pulses 14-19, dominant frequency of pulses ~2.6kHz. B, CH1, sample 1, 2 ♀♀, pulses 1-3, dominant frequency of pulses ~3.8, 2.6 & 2.6kHz. C, CHFC1, sample 1, ♂ & ♀, pulses 4-20, chirp and chatter transition, dominant frequency of pulses ~3.8kHz. Darker shades indicate higher decibel readings.

TABLE 1. Recording data. LR, low resolution.

| Rec. No. | Sex & sample No. | Pulses/call duration (sec.) | Pulses/sec. | Pulse width (msec.) | Estimated dominant frequency (kHz) |
|----------|------------------|-----------------------------|-------------|---------------------|------------------------------------|
| FC1      | ♂ & ♀, s1        | 12/1.7                      | 7           | 87-133              | 3.0                                |
| FC2      | ♂ & ♀, s1        | 9/1.5                       | 6           | 87-156              | 2.6                                |
| FC3      | ♂ & ♀, s1        | 11/1.5                      | 7.3         | LR                  | LR                                 |
| FC4      | ♂ & ♀, s1        | 17/2.5                      | 6.8         | LR                  | LR                                 |
| FC5      | 2 ♂, s3          | 10/1.2                      | 8.3         | 76-114              | 3.8                                |
| FC6      | 2 ♂, s3          | 18/2.2                      | 8.2         | LR                  | 3.1                                |
| FC7      | 2 ♂, s3          | 23/2.9                      | 7.9         | LR                  | LR                                 |
| FC8      | 2 ♂, s4          | 19/3.4                      | 5.6         | 72-167              | 3.8                                |
| FC9      | 2 ♂, s4          | 20/3.4                      | 5.9         | 76-167              | 2.6                                |
| FC10     | 2 ♂, s4          | 21/3.6                      | 5.8         | 125-156             | 2.6                                |
| FC11     | ♂ & ♀, s5        | 18/3.3                      | 5.5         | 87-163              | 3.6                                |